Stated Meeting, December 3.

A. D. Bache, LL.D., Vice-President, in the Chair.

Present, thirty-four members.

Dr. Bache introduced Major Sanders, of the corps of Engineers, to the presiding officer.

Letters were received and read:—

From the Royal Academy of Sciences of Berlin, dated 26th July, 1847, and 15th August, 1847, announcing a donation to the Society, and acknowledging the receipt of Proceedings and Transactions of the Society: and,—

From the Royal Institute of Sciences, Belles-Lettres and Arts of the Low Countries, dated Amsterdam, 24th August, 1847, acknowledging the receipt of Transactions and Proceedings of the Society.

The following donations were announced:—

FOR THE LIBRARY.

Nouveaux Mémoires de l'Académie Royale des Sciences et Belles-Lettres de Bruxelles. Tome XIX. 1845. Tome XX. 1847. 4to.—*From the Academy.*

Mémoires Couronnés et Mémoires des Savants Étrangers, publiés par l'Académie Royale des Sciences, des Lettres et des Beaux-Arts de Belgique. Tome XIX. 1845 and 1846. Tome XX. Tome XXI. 1846. 4to.—*From the same.*

Bulletins de l'Académie Royale des Sciences et Belles-Lettres de Bruxelles. Tome XII. 2me Partie. 1845. Tome XIII, en deux Parties. 1846. Tome XIV. 1re Partie. 1847. 8vo.—*From the same.*

Annuaire de l'Académie Royale des Sciences, des Lettres et des Beaux-Arts de Belgique. Douzième Année, 1846. Treizième Année, 1847. 12mo.—*From the same.*

Abhandlungen der Königlichen Akademie der Wissenschaften zu Berlin. Aus dem Jahre, 1845.—*From the Academy.*

Bericht über die zur Bekanntmachung geeigneten Verhandlungen der Königl. Preuss. Akademie der Wissenschaften zu Berlin. July to December, 1846. January to June, 1847. 8vo.—*From the same.*

Annales de l'Observatoire Royal de Bruxelles, publiées aux frais de l'État, par le Directeur, A. Quetelet. Tome V. 4to.—*From the Director, A. Quetelet.*

Annuaire de l'Observatoire Royal, par le Directeur, A Quetelet. 1846 et 1847. 18mo.—*From the same.*

Boletin de la Sociedad Economica de Valencia. Año 8°. Tomo 4°. Julio, Marzo, 1847. 8vo.—*From the Society.*

Journal of the Franklin Institute of the State of Pennsylvania. Vol. XLIV. Nos. 262, 263. Third Series. Vol. XIV. Oct., Nov., 1847. No. 11. 8vo.—*From the Institute.*

Proceedings of the Historical Society of Pennsylvania. Vol. I. June, 1847. 8vo.—*From the Society.*

Observations des Phénomènes Périodiques. Par A. Quetelet. Extracted from the 19th and 20th volumes of the Brussels Academy. 4to.—*From the Author.*

De l'Influence du Libre Arbitre de l'Homme sur les Faits Sociaux, et particulièrement sur le nombre des Mariages. Par M. A. Quetelet. Extrait du Tome III. du Bulletin de la Commission centrale de Statistique. 4to.—*From the Author.*

Sur les Anciens Recensements de la Population Belge. Par M. A. Quetelet. Extrait du Tome III. du Bulletin de la Commission centrale de Statistique de Belgique. 4to.—*From the Author.*

Enquête sur le Travail et la Condition Physique et Morale des Ouvriers employés dans les Manufactures de Coton, à Gand. Par M. M. J. Mareska, et J. Heyman. 8vo.—*From M. Quetelet.*

Mémoire sur les Étoiles Filantes, ainsi que sur les Météores en général, par rapport à leurs causes déterminantes. Par Thomas Ignace Marie Forster. 8vo.—*From M. Quetelet.*

Chronicles of the First Planters of the Colony of Massachusetts Bay, from 1623 to 1636. Now first collected from original Records and contemporaneous Manuscripts, and illustrated with Notes. By Alexander Young. Boston, 1846. 8vo.—*From the Author.*

Chronicles of the Pilgrim Fathers of the Colony of Plymouth, from 1602 to 1625. Now first collected from original Records and contemporaneous printed Documents, and illustrated with Notes. By Alexander Young. Second Edition. Boston, 1844. 8vo.—*From the Author.*

Revolutionary Services and Civil Life of General William Hull; prepared from his Manuscripts, by his Daughter, Mrs. Maria Campbell. Together with the History of the Campaign of 1812,

and Surrender of the Post of Detroit; by his Grandson, James Freeman Clarke, New York. 1848. 8vo.—*From the Editor.*

The Medical News and Library. Vol. V. Dec. 1847. No. 60. 8vo.—*From Messrs. Lea & Blanchard.*

Report of the Organization Committee of the Smithsonian Institution. Report of the Board of Regents, submitted to Congress, of the Operations, Expenditures, and Condition of the Smithsonian Institution.—*From T. R. Peale, Esq.*

Professor Henry presented a communication from Mr. T. Allen, entitled "An account of the inflammable Gas-wells on the banks of the Kanawha river, in Virginia, as they appeared in June, 1847," which was read by the Secretary.

Mr. Allen states that the term "gas-well" is applied in that part of the country to designate certain borings or artesian wells, made to the depth of from 1000 to 1800 feet, for the purpose of procuring stronger brine than that nearer the surface, from which escape, together with the brine, large quantities of carburetted hydrogen gas, which is applied as a fuel in the process of manufacturing the salt. The boring is about 3 inches in diameter, and is fitted with a copper-pipe, from the top of which the mingled gas and liquid, forced upward by the pressure at the bottom of the well, are conveyed through wooden-pipes to a square cistern of planks, supported at a height of 10 to 12 feet above the level of the soil, for the purpose of obtaining a head for distributing the liquid to the evaporating pans. In this cistern is placed a gas-holder, made of a portion of the trunk of a hollow sycamore (buttonwood) tree, closed above by a plank top, and open below, beneath which the conducting pipe terminates. The gas and liquid at once separate, and while the latter is conducted to the salt-pans, the former accumulates in the gas-holder, and is conveyed through a wooden pipe from its top to the furnace chamber, where it is distributed through iron-tubes inserted in the masonry. The furnace chamber is about 100 feet in length, and 5 or 6 feet wide, furnished below with an ordinary grating to admit air, (the supply of which is regulated by flat stones covering more or less of the openings), and closed above by the bottoms of the cast iron salt-pans. The gas being specifically lighter than the air, rises and occupies the upper portion of the chamber in contact with the pans, but burns only at its lower surface where it is in contact with the air; thus furnishing a sheet of flame suspended midway of the height of the cham-

ber. The evaporating pans are fitted with wooden covers, and the vapour escaping from them is conducted through pipes passing through the cisterns before spoken of, and by its condensation furnishes a large quantity of perfectly soft water. The excess of the gas is used as fuel under the boiler of a steam engine employed in boring another well, and for the purposes of lighting up the establishment at night.

In the works from which the description was taken, 450 bushels of good merchantable salt are made daily, and can be sold at 18 cents per bushel. It is not every brine-well, however, which furnishes the gas; nor is the supply unlimited, since the first gas-well has entirely given out. The temperature of the water from all these wells is the same as that of the coldest spring water, which contrasts singularly with the phenomena found in corresponding borings in Europe, such as the well at Grenelle, the temperature of whose water is 85°, and the observed increment below the point of constant temperature, 1° for every 50 feet.

Mr. Allen attributes the rise of the water to the hydrostatic pressure in subterranean currents extending from the tops of the surrounding mountains; the gas he supposes to be developed during the conversion of the bituminous coal (with which the region abounds) into coke, graphite and anthracite; the coldness of the water he attributes to the solution of the salt. The borings are through soft, crumbling sandstone, into which the drills penetrate easily and perforate a channel like a tube of stone. They are usually 2¾ or 3 inches diameter, and to prevent the infiltration of the upper weaker brine, are lined with a copper tube of about 2 inches diameter, made continuous by being tightly united by screw-joints of cast brass, and with a strip of leather around the lower end to make the tube fit tight to the bore of the drill hole. The contract price for boring to the depth of 1000 feet, is $2.50 per foot, the necessary steam-power being furnished, and six months allowed to execute the work.

The drilling apparatus consists of "auger-rods," as they are termed, made of round pieces of oak of about 2 inches diameter, and often 20 feet long, the sections being united by iron screw-joints. The bottom sections of the auger-rods are made of iron, terminated with a steel drill, this heavy metal being used to cause the descent of the wooden rods in the water that usually fills the drill-hole. The lower iron rods are for this reason called by the workmen "sinkers."

The lowest steel-pointed section of the auger-rod is formed with an open slit at the end of its junction with the section next above it, in-

stead of being connected by a fast screw-joint. This contrivance allows of the descent of the great length of several hundred feet of the auger-rod, without expending its whole momentum upon the drill, which is thus always allowed to fall with the uniform force of its own weight alone, there being sufficient scope in the length of the slit to allow the weight of the auger-rod to become arrested by the elastic rope employed to lift and drop it, to produce the desired churning movement.

Professor Bache left the chair, which was taken by Dr. Patterson.

Professor Bache then communicated a description of a base apparatus, planned by him and executed by Mr. Wm. Wardeman, mechanician of the coast survey.

The base apparatus presented some novel feature in construction, the adaptation of others not hitherto used in field work, and a choice of parts previously used by others. The general plan was devised by me, and the details by Mr. William Wardeman, mechanician of the coast survey, by whom they were executed under my direction. The following are the general features of the apparatus. 1. The measuring bars were upon the compensating system first used, I believe, by Col. Colby in Great Britain, and by Mr. Borden in the United States, but the mode of obtaining the compensation differed entirely from that used by either of these gentlemen. 2. A principle was introduced in reference to the dimensions of the bars which, if at all recognised, has not been hitherto applied. A bar of brass and a bar of iron of the same dimensions, exposed to the same source of heat, will not heat equally in equal times; this is well known to depend upon the different conducting powers of the two metals, their different specific heats, and the different powers of their surfaces to absorb heat. The bars then, if of equal sections, when the temperature is rising or falling, have not the same temperature, and the system is not compensating. The surfaces are easily made to absorb equally by the same coating, and the sections must be so proportioned to each other that the bars will have the same temperature when exposed to variable temperatures of the atmosphere and of the case containing them. Having arranged the sections approximately, using numbers taken from the books, the change, in length, during increase or decrease of temperature, were not perceived when microscopes were used supported upon wooden stands, or even upon stone blocks of small size; the means of measurement were not sufficiently delicate to perceive

them, or they were masked by greater changes in the supports. When the level of contact was substituted for the microscopes, or when Mr. Saxton's reflecting pyrometer was employed, these changes became very perceptible, and it was necessary to resort to direct experiment upon the materials of the bars themselves to obtain even approximate results, and then to correct a small residual quantity by applying a covering more absorbent of heat to one bar than to the other. If such changes have not been perceived hitherto, it has been because adequate means were not used to detect them. 3. The lever of contact and level, first used, I believe, in the adjustment of standard measures by Bessel, was applied to indicate the lengths of the bars. The levels were so delicate, that several divisions upon them made up a quantity entirely insignificant in the measurement. The doubt which I had was whether the sensibility of the apparatus had not been carried too far; this was, however, entirely removed upon finding the rapidity and certainty with which it could be used. The contact between two adjacent measures was between a blunt knife edge and a plane of agate. 4. The trussed support for the bars adapted to bearing the apparatus at two points only, and the tin covering or tube which surrounded the whole, were similar to those used by Mr. Borden, but differed entirely in the adaptation of them; the bars moved freely on the trussed frame upon rollers, and were not attached to the covering tube in which the trussed frame itself was merely supported. The tin covering was conical and was doubled. 5. The tressles admitted of the various motions required in placing the apparatus, and the length of the whole about twenty feet, (six metres), gave a weight which permitted easy and rapid transfer by four men, when covered with several thicknesses of imperfectly conducting material to keep the fluctuations of temperature within moderate limits. The contacts were usually made in much less time than the setting of the forward tressles for the measure. The following statistics of the measurement of a base line on Dauphin Island, at the entrance to Mobile bay, with this apparatus, will suffice for the present to show that we have obtained a useful auxiliary in a geodetic survey, especially when the difficulties of triangulation render advisable the measurement of frequent bases. The greatest length measured in the course of a day, in the final measurement, was one hundred and eighty-three tubes, equal to nearly seven-tenths of a mile; the least forty-seven, or one-quarter of a mile; the average one hundred and four tubes, or four-tenths of a mile. The whole measurement of nearly seven miles was completed in seventeen

working days, not reckoning the time lost by bad weather, or occupied by change of camp, and by comparisons of the apparatus. The length of the apparatus was compared, before and after the final measurement, with a standard iron bar with which it had been compared in the Coast Survey office, by using Mr. Saxton's reflecting pyrometer.

The accuracy with which a remeasurement of considerable length could be made was tested more than once in the measurement, but it was determined to make a more complete direct trial by establishing intermediate marks, and noting by the microtelescopes attached to the ends of the bars the deviation at intervals. The greatest deviation in the length of seventeen tubes was between one and two-hundredths of an inch, the average in cases of repetition, not regarding signs, was five one-thousandths of an inch, the final error at the end of the one-third of a mile remeasured was nothing. The probable error of remeasuring one hundred and twelve yards was less than five ten-thousandths of an inch, making on the whole length of the base, and supposing all the errors to fall in the same direction, which is physically most improbable, less than nine-tenths of an inch. The great practical difficulty found at the outset was to obtain a mark which would stand unmoved in the sand to which to refer the apparatus on recommencing a measurement; this was satisfactorily obviated after many experiments, and the marks which I have just stated to have been placed at intervals may be assumed generally to have been stationary from one measurement to another. Incidentally, this remeasurement gave a strong test of the perfect compensation of the apparatus under sudden changes of temperature, as well as for different stationary temperatures. A storm came up after the second measurement was commenced, which interrupted it for between one and two hours, and cooled the air suddenly about four degrees. The second measurement was therefore made at a lower temperature by some degrees than the first, and under expcsure to a sudden fall of temperature.

The chair having again been taken by Prof. Bache,—

Professor Henry made a communication relative to some observations on the Aurora Borealis, with the object of determining the height of the meteor. The result of the observations tended to establish the fact, that the arch of the aurora, like the rainbow, is a local phenomenon, each observer seeing a different object.

Professor Bache submitted to the Society, certain charts of the progress of the survey under his superintendence.

Dr. F. Bache reported the decease of Mr. James Ross, of Pittsburg, a member of this Society, who died on the 27th of November, 1847.

The Treasurer presented to the Society his annual report on the state of its funds.

The Committee of Publication made their annual report.

Pending nominations, from No. 197 to 202, were read.

The following communication was received by the Secretary previous to the meeting, but accidentally omitted; which being represented to the Society, they, by resolution of January, 1848, directed the paper to be inserted in the proceedings of the meeting at which it should have been read.

Corrections and Additions to his paper on the Longicornia of the United States, by S. S. Haldeman.

Since the year 1844, in which the greater portion of the former paper was prepared, a number of doubtful points have been solved, species detected, and errors discovered, which it was not practicable to insert during the publication, but which are now presented that they may bear the date of the original article, at least as far as the year is concerned. The original numbers are employed, and continued after 284, for the additional species cited.

2, 6. Orthosoma cilipes *Say*, is a Mallodon, of which M. simplicicolle is a synonym. Cab. Le Conte.

17. *For* solitarius *read* solitarium.

21. Cerasphorus quadrispinosus = rusticus *F.* 2, 311. Oliv. 69 tab. 2.16, the locality of Fabr. being incorrect. Chion *Newn.*, takes precedence of Cerasphorus.

22. Enaphalodes lecontei ⊥ *Dej.* is correctly referred. The genus scarcely differs from Elaphidion. The inverted mark ⊥ is used to indicate an uncharacterised name, and ‡ (See No. 85) to signify *in error*. Both are to be placed *between* the name and the authority, thus *separating* what do not properly belong together. With these, two vertical lines may indicate a name improperly employed for the second time, as Heteroscelis || *Dupont*, which is Campylocnemis *Ww.*, there being another genus previously named Heteroscelis. See No. 319.

25. *For* Elaphidion aspersum, *read* incertum *Nm.*